NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

APPENDIX E

ISSUED: January 22, 1974

Forwarded to:
Honorable Alexander P. Butterfield
Administrator
Federal Aviation Administration
Washington, D. C. 20590

SAFETY RECOMMENDATION(S)

A-73-116 thru 118

(revised)

The National Transportation Safety Board's investigation of a National Airlines Douglas DC-10 accident, which occurred in flight near Albuquerque, New Mexico, on November 3, 1973, disclosed a malfunction in the digital flight data recorder (DFDR). This malfunction precluded recovery of any data related to the accident. The Board is very much concerned about this type of failure, because it is not detectable by the test equipment aboard the aircraft and, therefore, might exist on a large number of aircraft equipped with the new DFDR.

National Airlines subsequently performed readouts of the DFDR throughout their entire fleet of wide-bodied aircraft to assess the extent of similar undetected malfunctions. Testimony at the Safety Board's public hearing held in Miami, Florida, on December 10-12, 1973, and subsequent readout examinations disclosed that, of 13 wide-bodied jets in the fleet, 7 had been operating with undetected malfunctions which would have precluded recovery of acceptable data for some parameters required under 14 CFR 121.343(a)(2).

In meetings with your staff, the Board's staff has discussed the preliminary findings of the survey of DFDR's conducted under GENOT 8000.92. In the Board's opinion, these preliminary findings also indicate that the current 2,000- to 3,000-hour inspection intervals are unrealistic and should be adjusted to be commensurate with the mean-time-between-failure (MTBF) rates that these recording systems have been experiencing during this early period of operation.

Therefore, to insure that recorders in the current fleet of wide-bodied jets are operating in an approved manner, as specified under 14 CFR 121.343 (a)(1), (2), and Appendix B, the National Transportation Safety Board recommends that the Federal Aviation Administration:

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1. Require, within the next 100 flight hours, a readout of data recorded in flight on the digital flight data recorders, as required under 14 CFR 121.343(a)(2), and take action to insure that the parameters required are being recorded within the ranges, accuracies, and recording intervals specified in Appendix B thereof.

2. Require repetitive readout inspections, as specified above, at 500-hour intervals, until the reliability of these recorder systems improves.

3. Require retention by the operators of the data received in the two most recent readout inspections.

Personnel from our Bureau of Aviation Safety offices will be made available if any further information or assistance is desired.

REED, Chairman, McADAMS, BURGESS, and HALEY, Members, concurred in the above recommendations. THAYER, Member, was absent, not voting.

By John H. Reed
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20590

OFFICE OF
THE ADMINISTRATOR

FEB 8 1974

Honorable John H. Reed
Chairman, National Transportation Safety Board
Department of Transportation
Washington, D. C. 20591

Dear Mr. Chairman: Notation 1230

This is in reply to your Safety Recommendations A-73-116 thru 118 issued January 22, 1974, concerning your recommendations on digital flight data recorders relative to the National Airlines DC-10 accident of November 3, 1973. In addition, your release identified National Airlines operating with seven of 13 digital flight data recorders with undetected malfunctions.

The FAA has already initiated appropriate corrective action with regard to the National Airlines readout deficiencies which were cited in your letter.

Several other actions have been taken by the FAA. Immediately following the accident we initiated a national survey regarding the performance of all installed digital flight data recorders. Our accumulated data is sufficiently conclusive that a rule or regulation change at this time is not necessary. We have determined that the present maintenance programs with certain adjustments are adequate. We have also initiated a related maintenance bulletin to be released soon to all maintenance personnel which recommends corrective action in those cases where mean-time-between-failure (MTBF) and inspection frequencies are not deemed sufficient to properly service and maintain the digital flight data recorder.

The equipment combination involved in the National Airlines DC-10 accident is peculiar only to National Airlines. We believe the actions taken are appropriate and that our present rules are adequate. To apply your stringent recommendations based on a single accident would be inappropriate and would not serve the best interests of the aviation industry.

Sincerely,

Alexander P. Butterfield

Alexander P. Butterfield
Administrator

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: February 7, 1974

Forwarded to:

Honorable Alexander P. Butterfield
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-74-7 thru 11

The National Transportation Safety Board's continuing investigation of the National Airlines DC-10 accident near Albuquerque, New Mexico, on November 3, 1973, has disclosed unsafe conditions in the passenger oxygen system, portable oxygen system, and cabin pressurization system. The Board believes that these unsafe conditions merit your immediate attention and the attentions of all air carriers which operate aircraft with this equipment.

When the aircraft lost a cabin window and the passenger cabin decompressed, many of the passenger's oxygen-generating units were activated. Three oxygen canisters came out of their mountings in the seatback oxygen compartment and fell onto passenger seat cushions. Two of these canisters, which become very hot when operating, scorched the cushions and burned fingers when seat occupants tried to remove them. The third reportedly caused a small fire. The canisters came out of their mounting brackets because of the pulling force exerted on either the initiation lanyard of the canisters or the oxygen supply hose. The Safety Board believes that these canisters constitute a potential fire and injury hazard when they are not retained properly in their mountings.

A subsequent inspection of a similar DC-10 aircraft at National Airlines' maintenance base in Miami, Florida, also revealed improperly mounted canisters. The improper mountings were a result of a slight distortion of the base plate and short mounting studs on the canister. Also, some of the oxygen supply hoses and the masks were improperly packaged. The Board

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found that shortcomings exist in both the design of the mounts of these oxygen units and related maintenance and servicing practices.

Another unsafe condition exists in the storage and availability of the portable oxygen equipment aboard the DC-10 aircraft. Portable oxygen bottles are contained in enclosed cabinets near the cabin attendants' stations. The regulator assemblies were covered with cellophane-type wrapping which was held by an elastic band. K-S disposable oxygen masks and supply tubing were sealed separately in plastic bags and stored with, or near, the portable oxygen bottles.

Paragraph (4) of 14 CFR 25.1447 "Equipment Standards for Oxygen Dispensing Units" requires that portable oxygen equipment be immediately available for each cabin attendant. The Board questions the "immediate availability" of such equipment when it must be unwrapped and assembled before it can be used, considering the reduced time of useful consciousness at flight level altitudes.

A third condition which the Board believes merits your attention is the distinct possibility that separate pressure losses of different magnitudes may occur on the DC-10. Preliminary estimates suggest that the lower lobe galley and the adjacent cargo compartment of the subject aircraft decompressed faster than the main passenger cabin or the cockpit area. This theory is reinforced by the fact that the two cabin attendants in the lower lobe galley lost consciousness almost immediately after the decompression.

The Board's concern about the third unsafe condition is twofold:

1. The aneroid device, which detects unacceptable cabin pressure altitudes in the aircraft and causes the oxygen dispensing units to be deployed automatically in such cases, is located in the ceiling of the forward passenger cabin. It controls the deployment of oxygen masks in the entire aircraft. Therefore, if decompression occurred in the lower lobe of the aircraft, it might not be sensed by the aneroid device in the passenger cabin, and supplemental oxygen would not be available to the

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occupants in the lower galley. This apparently occurred in the subject accident, and both cabin attendants in this section of the aircraft lost consciousness as they attempted to retrieve the portable oxygen bottles. The Board believes that such a situation can seriously threaten the safety of occupants of the lower galley.

2. Two portable oxygen units which were located in the lower lobe galley of the aircraft were stowed on the forward wall of the galley and outboard of the escape ladder. One bottle was fitted with a "full-face" smoke mask, which was sealed in a plastic container. The other bottle was the type which must be fitted with a supply hose and a K-S disposable mask before it may be used. Not only is the Board concerned about the time required to unpack parts for these units and assemble them, but it also believes that their location makes them virtually inaccessible when service carts are in their storage place in the galley.

Our staff has learned informally that some of the problems delineated above are being assessed by Flight Standards personnel of the FAA's Western Region to determine whether shortcomings in design and servicing exist.

The Safety Board is continuing its investigation and may make further recommendations regarding this accident. However, it believes that the safety of the traveling public requires immediate steps to prevent recurrence of the problems outlined above.

Accordingly, the National Transportation Safety Board recommends that the Federal Aviation Administration:

1. Require all operators of aircraft which contain individual chemical oxygen-generating units to inspect these installations to ensure that canisters are correctly installed in the mounts and that approved packing procedures have been followed for the supply hoses and oxygen masks.

2. Issue an Airworthiness Directive to require changes in the method of mounting these oxygen-generating units to eliminate the possibility of improper installation and inservice failures.

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3. Issue a maintenance bulletin to verify operator compliance with the provision of 14 CFR 25.1447 regarding the immediate availability of portable oxygen units and the necessity of having supply hoses and masks attached to these units.

4. Issue an Airworthiness Directive to require aircraft certificated under 14 CFR 25, that each occupiable area, which is separated from others to such an extent that significantly different decompression rates can occur, is equipped with an aneroid device to detect pressure losses in that area.

5. Require a more accessible location for the portable oxygen units in the lower lobe galley of all DC-10 aircraft and relocate portable oxygen units in all other aircraft, where required, to ensure accessibility of portable oxygen units and compliance with the FAR's.

Personnel from our Bureau of Aviation Safety offices will be made available if any further information or assistance is desired.

REED, Chairman, McADAMS, and HALEY, Members, concurred in the above recommendations. THAYER and BURGESS, Members, were absent, not voting.

By: John H. Reed
Chairman

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DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20590

OFFICE OF
THE ADMINISTRATOR

FEB 21 1974

Honorable John H. Reed
Chairman, National Transportation Safety Board
Department of Transportation
Washington, D. C. 20591

Notation 1230A

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendations A-74-7 thru -11.

Recommendation No. A-74-7. Require all operators of aircraft which contain individual chemical oxygen-generating units to inspect these installations to ensure that canisters are correctly installed in the mounts and that approved packing procedures have been followed for the supply hoses and oxygen masks.

Comment. We are issuing a maintenance bulletin which will instruct principal inspectors to review the air carrier operators' maintenance programs to determine that sufficient inspections are specified for the oxygen generating units and associated supply hoses and masks. Principal inspectors will request more frequent inspections if necessary.

Recommendation No. A-74-8. Issue an Airworthiness Directive to require changes in the method of mounting these oxygen-generating units to eliminate the possibility of improper installation and in-service failures.

Comment. We are working with the Douglas Aircraft Company to assess the DC-10 passenger oxygen units. This investigation will result in a redesign and modification of the units. Airworthiness directives or other appropriate directives will be issued to implement the new design.

Recommendation No. A-74-9. Issue a maintenance bulletin to verify operator compliance with the provision of 14 CFR 25.1447 regarding the immediate availability of portable oxygen units and the necessity of having supply hoses and masks attached to these units.

Comment. The maintenance bulletin will include instructions to the principal inspectors to determine that portable oxygen bottles with hose and mask assemblies attached are immediately available to all crewmembers.

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Recommendation No. A-74-10. Issue an Airworthiness Directive to require aircraft certificated under 14 CFR 25, that each occupiable area, which is separated from others to such an extent that significantly different decompression rates can occur, is equipped with an aneroid device to detect pressure losses in that area.

Comment. We are working with Douglas to determine the best method to prevent significant pressure differentials in different compartments from occurring and what changes in the aneroid system are required to ensure oxygen system operation in all areas.

Recommendation No. A-74-11. Require a more accessible location for the portable oxygen units in the lower lobe galley of all DC-10 aircraft and relocate portable oxygen units in all other aircraft, where required, to ensure accessibility of portable oxygen units and compliance with the FAR's.

Comment. We are working with Douglas to select more accessible locations for the portable oxygen units in the lower lobe galley. When the new locations are determined, we will take appropriate action to implement relocation.

Sincerely,

Alexander P. Butterfield

Alexander P. Butterfield
Administrator

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: February 26, 1974

Forwarded to:

Honorable Alexander P. Butterfield
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)
A-74-18

On November 3, 1973, an in-flight emergency took place aboard a National Airlines DC-10 near Albuquerque, New Mexico. The accident occurred when the fan assembly of the No. 3 engine disintegrated and pieces struck the aircraft, causing rapid decompression of the fuselage. One passenger was ejected from the aircraft, other passengers were injured, and cabin attendants were incapacitated. The captain immediately made an emergency descent and landed the aircraft 19 minutes later at Albuquerque.

According to testimony given by National Airlines personnel during the National Transportation Safety Board's public hearing, the crewmembers did not assess the structural damage to the aircraft in flight after the emergency was under initial control. Also, the cabin attendants did not inform the flightcrew of the damage to the fuselage and galley or of the fire and smoke in the cabin.

The flightcrew, cabin attendants, and training personnel of National Airlines testified that the carrier does not have established procedures for assessing damage that results from in-flight emergencies.

Flightcrews of some other carriers who were questioned about their in-flight emergency procedures also indicated that they do not have such procedures nor receive training on the subject. This has been evident in other accidents where the flightcrew was unaware of the extent of damage.

The Safety Board believes that flightcrews should be provided procedures by which damage that results from in-flight emergencies can be assessed so that they may have all the information possible to handle such emergencies adequately.

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Honorable Alexander P. Butterfield

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> Issue an operations alert bulletin to ascertain compliance with 14 CFR 25.1585(a)(4), relative to a procedure for the assessment of aircraft damage that results from in-flight emergencies.

Personnel from our Bureau of Aviation Safety will be made available if any further information or assistance is desired.

McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendation. REED, Chairman, was absent, not voting.

By: John H. Reed
Chairman

APPENDIX E

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20590

OFFICE OF
THE ADMINISTRATOR

FEB 27 1974

Rotation 12308

Honorable John H. Reed
Chairman, National Transportation
Safety Board
Department of Transportation
Washington, D. C. 20591

Dear Mr. Chairman:

I have reviewed Safety Recommendation A-74-18 concerning the Board's investigation of National Airlines' DC-10 accident near Albuquerque, New Mexico, on November 3, 1973.

We essentially agree on the need for procedures to assist air carrier flight crews to assess inflight damage to the aircraft and will issue an appropriate bulletin on this subject.

Sincerely,

Alexander P. Butterfield
Administrator